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AUG 22 2014

OFFICE OF WATER RESOURCES  
DIVISION OF RESOURCE MANAGEMENT

Federal Consistency Coordinator  
Illinois Coastal Management Program  
Illinois Department of Natural Resources  
160 N. LaSalle Street, Suite 700  
Chicago, IL 60601

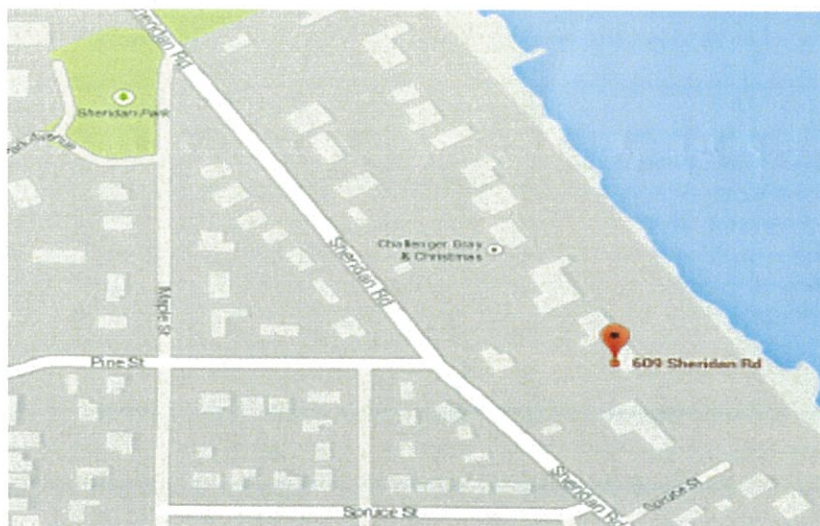
To Whom It May Concern:

August 1, 2014

In compliance with the Illinois Coastal Management Federal Consistency Review Procedures, we provide the following information for a proposed quarystone breakwater-protected beach for the property located at 609 Sheridan Road, Winnetka, Illinois 60093, owned by Jeffrey Quicksilver.

#### **Location of Project**

The proposed quarystone breakwater- protected beach will be built on the lakefront of the property located at 609 Sheridan Road, Winnetka, Illinois 60093, owned by Jeffrey Quicksilver.



#### **Project Start Date and Duration**

Work will not begin until all necessary permits have been received. It is anticipated that the project can begin by July 15, 2015. This work will require approximately 10 weeks to complete.

**Extent of Work to be Conducted**

A quarrystone breakwater will be built extending northeast from the concrete and steel pier encapsulating the steel groin and continuing northeast. The lakeward toe of the structure will extend to 125' east of the concrete splash apron and the breakwater will have a nominal length of 90 feet with a crest elevation of 586' (IGLD 1985) tapering to 582' (IGLD 1985) at the lakeward end. Mitigational sand will be placed in a quantity of 1,850 tons in the system. To help reduce erosion and beach scour, a revetment will be built along the existing seawall and pier.

**Contact Information**

All questions pertaining to this project can be submitted to:

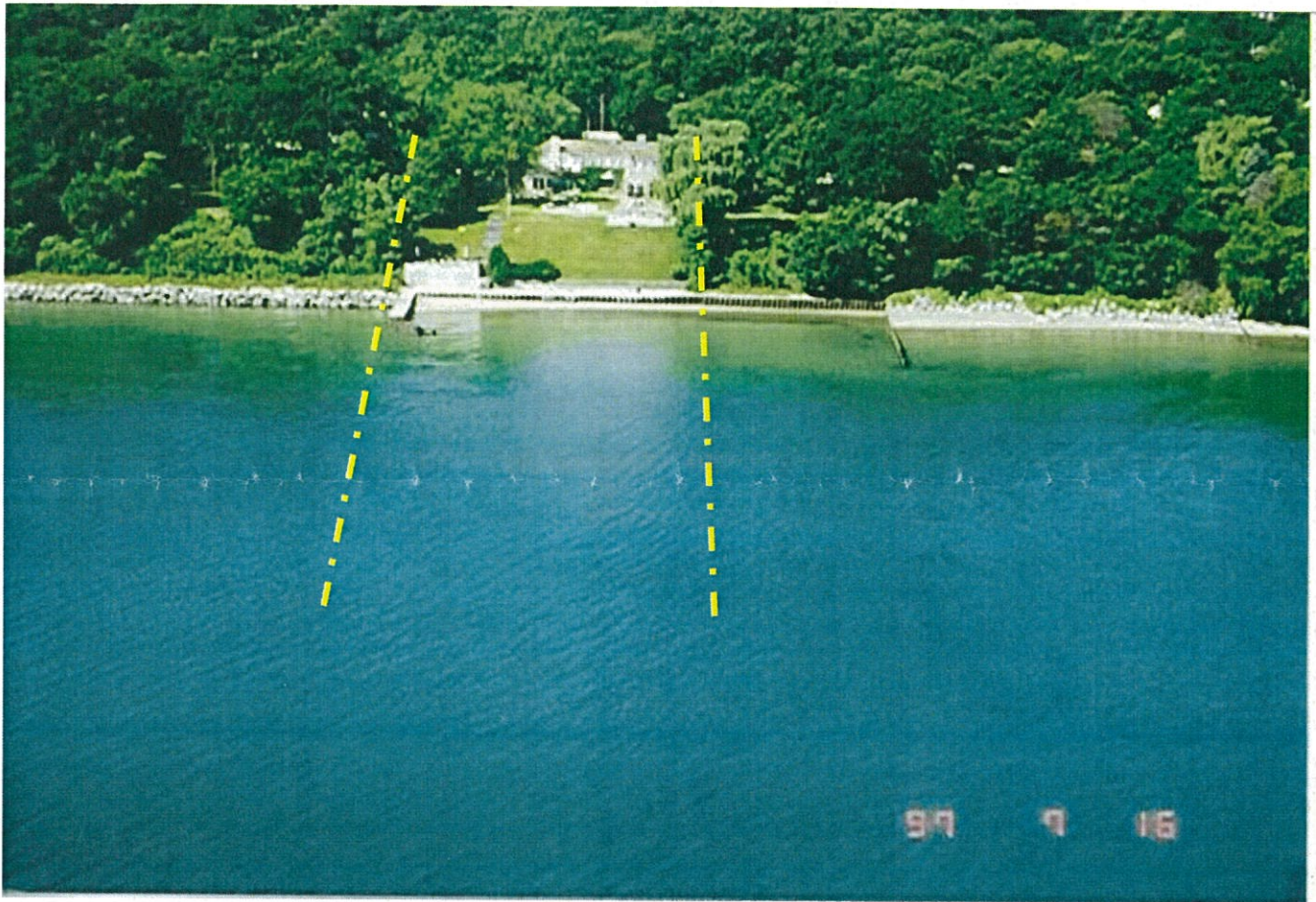
Jon Shabica  
Shabica & Associates, Inc.  
550 Frontage Road, Suite 3735  
Northfield, IL 60093  
[jon@shabica.com](mailto:jon@shabica.com)  
847-446-1436 Tel  
847-716-2007 Fax

The proposed activity complies with Illinois' approved Coastal Management Program and will be conducted in a manner consistent with such policies.

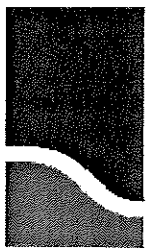
Sincerely,



Jon Shabica  
Vice President



1997 Aerial Photo (Approximate Property Lines in Yellow)



**Shabica & Associates, Inc.**  
WE BUILD BEACHES

Ms. Kathy Chernich  
East Section Chief, Regulatory Branch  
Chicago District  
U.S. Army Corps of Engineers  
231 S. LaSalle Street, Suite 1500  
Chicago, IL 60604

Dear Ms. Chernich:

August 1, 2014  
Rev. September 9, 2014

Please find enclosed a permit application for shore protection for the property located at 609 Sheridan Road, Winnetka, Illinois, 60093, owned by Mr. Jeffrey Quicksilver. Proposed work includes construction of a quarystone breakwater, a quarystone revetment and sandfill, as required. A letter of authorization is attached from the adjacent south property owner, Mr. Byron Trott, for the placement of sand, as required for the project.

*A Design of Shoreline Erosion Protection* report has been attached to this cover letter as the coastal design specifications component of this permit. All references, photographs and figures referred to in the cover letter and the following report can be found in the Appendix.

The proposed activity complies with the approved Illinois Coastal Management Program (ICMP) and will be conducted in a manner consistent with such policies. A separate letter has been submitted to the ICMP office.

**Project Purpose Statement**

The property owner has retained Shabica & Associates (SA) to design and engineer a shore protection system for his property. This project will be constructed on the lakefront of 609 Sheridan Road, Winnetka, where, the new homeowner wants to reduce lakebed downcutting that will eventually destabilize the existing pier and seawall. The sandy beach at this site has deflated over the years. Even with recent low lake levels, the beach is narrower during all lake levels with stormwaves overtopping the existing concrete seawall and eroding the bluff landward.

The bluff at this site has a sloped, grassy face down to a concrete splash apron. Lakeward of the concrete splash apron is a sandy beach that varies averages about 40' wide during low to average lake levels. At the south property line, there is a short concrete and steel pier (62' long) with a short steel groin extension (25' long) to the northeast. This structure helps to hold the beach that exists on the property at low lake levels.

A 105' long quarystone breakwater (toe to toe) will be built extending northeast from the existing concrete and steel pier at the south property line encapsulating the steel groin and continuing northeast. The lakeward toe of the structure will extend to 125 feet east of the toe of the bluff and the breakwater will have a crest elevation of 586' (IGLD 1985) tapering to 582' at the lakeward end. The slope of the breakwater will be 1v:1.5h. A quarystone revetment will be built along the existing seawall and wrap around along the existing pier to connect in with the beginning of the proposed breakwater. The north end of the revetment will protrude lakeward an additional 8' to help reduce sand movement in the beach cell during high lake levels, the crest of the breakwater will be 586'. The slope of the revetment will be 1v:1h. Mitigational sand will be placed in a quantity of 1,850 tons in the system.

This section of coastline has historically lost sand due to large municipal structures, such as Tower Road Cooling Basin in Winnetka to the north, Wilmette Harbor to the south and several municipal beach structures in between, as well as lakebed downcutting especially during prolonged periods of low lake levels. Nearshore sand deposits are thin to non-existent here (Figures 1 and 2, Appendix) and scientists estimate that the rate of lakebed erosion averages 6 inches per year (Nairn, 1997). The net result is similar to the effects of global warming and rising sea level on marine coasts. This includes deeper water nearshore, larger stormwaves and progressively narrower beaches as the nearshore lakebed continues to erode.

The Illinois Lake Michigan shoreline is considered “sediment starved” by coastal scientists. This is in contrast to East Coast and Gulf Coast open ocean shores where tens of thousands of tons of sand are found in the nearshore system that provide a primary line of defense against stormwaves. On most Great Lakes shores including southern Lake Michigan, natural sand beaches are not able to protect the lakeshore (exceptions may be during very low lake levels like 1964 or 2004-07). Large quantities of sand have been trapped or diverted offshore by municipal structures that extend 900 feet or more into the lake. Today, the main sand supply is wave erosion of the nearshore glacial clay lakebed that contains only about 10% sand (Shabica and Pranschke, 1994). The result is that groins are losing their effectiveness at holding a sandy beach during average to high lake levels. To retain a sand covering of the shallow lakebed (where downcutting is most active), as well as to protect the revetment and bluff toe, SA has designed a pocket beach system to hold sand, as necessary, to protect the lakebed and bluff during higher lake levels.

If beach and nearshore sand is lost, degradation of the nearshore ecosystem will result. Meadows et al., (2005) reports an increase in zebra mussels *Dreissena polymorpha*, and a decrease in native zooplankton in waters where the lakebed is eroding clay and rocks. In comparison, a nearshore area with 100% sand cover supports a species-rich community. The report concludes, “it [is] nonetheless clear that sand-based areas were characterized by sufficient shallow water fish CPUE and species richness to suggest that these are important habitats within the context of the Great Lakes Basin and not simply ‘wet deserts’ as they are often considered.”

### Design Options

The site at 609 Sheridan Road, Winnetka has been inspected and options for shore protection were determined using desktop coastal engineering, site conditions from the 2014 bathymetric survey, studying local prototypes, and several years of observations of the deteriorating shoreline conditions at this site. Given the sand loss over the last several years including during extreme low lake levels, as well as the uncertainty of future lake levels, it is prudent to engineer and design systems that will anticipate greater lakebed downcutting, higher amounts of beach erosion, more extreme storm events with larger waves, and potential loss of land. These four design options were considered:

#### OPTION 1

##### *Do Nothing –*

The first option of “Do Nothing” results in leaving the currently eroding beach in its existing state. This will allow lakebed erosion to continue allowing larger stormwaves to impact the coastline. Over time, the beaches along Illinois’ North Shore coastline have continued to narrow due to being in a sand starved system. At this site, the beach continues to narrow even with lower lake levels. Now with the water level rising, Lake Michigan waves are impacting the seawall.

#### OPTION 2

##### *Construct a Revetment –*

The second option considered is to construct a quarrystone revetment. This option provides enhanced stormwater protection at the cost of the following:

1. Continued erosion of the lakebed, which will ultimately destabilize the revetment toe
2. The beach will erode over time, as there is less sand in the system.



- 4) Beaches make better wildlife habitat than actively eroding bluffs or seawalls.
- 5) Stone headlands make better fish habitat than eroding lakebed clay.
- 6) Beaches protect the lakebed from erosion that causes larger stormwaves to impact the shore.
- 7) Beaches are far safer for swimmers and boaters than a coast lined with seawalls or revetments, especially in an emergency.
- 8) Beaches, unlike most steel or concrete seawalls, are not visual pollution.

#### **Impacts to Downdrift Properties**

The proposed project will have minimal impact on the property immediately downdrift of the subject property. The adjacent property to the south has a breakwater protected beach that functions well.

#### **Impact to Littoral Drift System**

The proposed plan for this site includes the construction of a quarystone breakwater and placement of sandfill as required for permit.

The section of Lake Michigan shoreline north and south of 609 Sheridan Road, Winnetka is fully engineered with steel groins, piers, seawalls, and quarystone breakwaters. Based on our experience, as the proposed structure will not extend beyond the existing structure to the south, it will not negatively impact the littoral system after the sandfill is placed (anticipated quantity plus 20% overfill). According to the Illinois State Coastal Geologist (Chrzastowski, 2005), "the design to contain placed sand is becoming necessary because of reduced volume of littoral sand in transport." He further states, "beach-cell systems may represent the future for beaches along much of the Illinois bluff coast from Waukegan south to Evanston."

The beach system will be nourished with sand including a 20% overfill placed north and south of the system. The new IDNR regulations for structures that will retain sand require pre- and post-construction surveys, as well as surveys at the one and five-year intervals. This new requirement will help assure that a sand equilibrium is met and that the new project is gaining and losing sand at a similar rate to neighboring properties.

#### **Impact on Public Uses**

Public access will not be impacted by the modifications to the existing system. No additional public access structures will be built as part of this project, however, public access should be improved by the engineered bay beach system retaining more sand and holding a higher beach profile during all lake levels. The beach will provide a safe place for boaters and swimmers in distress. Fishing will not be impacted negatively, as the underwater area of the quarystone protection will create an improved fish habitat. Additionally, navigation of water craft will not be impacted, as the proposed construction will not extend further east than the existing structure.

#### **Impact on Natural Resources**

Quarystone structures in the nearshore waters of Lake Michigan and sandy beaches improve native species habitat. The LandOwner Resource Centre with support from the Canadian Wildlife Service and the Ontario Ministry of Natural Resources states that, "unstable shorelines can release silt that can choke nearby aquatic habitats." Additionally, underwater structures such as artificial reefs constructed of large boulders and clean riprap material "in large water bodies, such as the Great Lakes . . . are often the best method of creating habitat." As stated above, according to Meadows, et al., 2005, "a nearshore area with 100% sand cover support[s] a species rich community." As the design does not impact the bluff and vegetation, the local terrestrial wildlife will continue to inhabit this property.

#### **Type of Permit**

The scope of this project requires an individual permit.

**Description and Schedule of Proposed Activity**

All of the proposed work will be completed via marine access. A barge will deliver a backhoe to work on land to place the materials. All stone will be delivered by barge to the site. Sand will be delivered by truck. Work will not begin until all necessary permits have been received. This work will require approximately 10 weeks to complete.

**Type and Quantity of Fill/Measures Taken to Avoid Impact/Erosion and Sediment Control Plan**

All material will be clean and from inland quarries. Approximately 1,665 tons of new, clean quarried stone will be placed to construct the revetment and breakwater. Approximately 1,850 tons of clean sand will be placed on the existing beach. All clay displaced from the lakebed for installation of the breakwater toe stone will be placed on the barge and removed from the site and disposed of properly. Acreage of stone placed on the lakebed east of the OHWM is less than 0.08 acres.

**Summary**

All of the above described activities and plans will follow IPP terms and conditions. All of the proposed work adheres to the guidelines prescribed by the Illinois Environmental Protection Agency and its Anti-Degradation Assessment. U.S. Fish & Wildlife Service and the Illinois Historic Preservation Association will be updated on all relevant correspondence.

If you have any questions please feel free to call me at the phone number below.

Sincerely,



Jon Shabica, Vice President

CC: IDNR (Casey)  
IEPA (Heacock)  
U.S. Fish & Wildlife Service  
Illinois Historic Preservation Agency (Haaker)  
William Bickford  
Jeff Quicksilver

## DESIGN OF SHORELINE EROSION PROTECTION

### Introduction

The following report summarizes assumptions and design criteria for a quarystone breakwater and sandfill mitigation to help reduce erosion and protect the property located at 609 Sheridan Road, Winnetka IL, 60093. The design is based on the drawings included in the permit application to the U.S. Army Corps of Engineers dated August 1, 2014.

The site lies within a fully engineered section of urban lakeshore that is typically protected with revetments, seawalls, impermeable piers, steel sheetpile groins and breakwater protected beaches that may hold narrow beaches. There are no naturally eroding bluffs in the area.

This section of coast is sand-starved due to municipal structures (littoral barriers) constructed over the past 100 years that extend lakeward beyond the littoral zone and reduce sand bypass. Although there is currently an exposed sandy beach due to extreme low lake levels, the beach width varies greatly due to the vulnerability of this location. According to the Illinois State Geological Survey, there is almost no sand moving along this section of coast. All structures in the area have been steadily losing their effectiveness at holding beach sand. This problem is exacerbated by lakebed erosion. In many cases where all the sand has been lost, the adjacent bluffs have begun to erode. To provide adequate protection for the upland property, solutions have typically been of two types: breakwater- or groin-anchored beaches to protect the bluffs, or large quarystone revetments placed against the toe of the bluff that prevent stormwave erosion but at the expense of the beach.

### Project Description

Construction of a quarystone breakwater and sandfill mitigation are proposed that fulfill the design requirements of 20-year stormwave erosion protection. The proposed system is designed for all lake level conditions.

### Summary Specifications

Using the Army Corps of Engineers Shore Protection Manual (1984), performance of nearby prototypes and other sources, the following specifications were developed for this site (elevations are based on IGLD 1985):

#### Stone Breakwater Specifications

Lakeward Crest Elevation:	582 ft
Toe of Structure:	574 ft (average)
Crest Width:	6 ft
Average Armor Size:	2.5 tons
"B" Stone	200 lbs to 800 lbs
Slope:	1:1.5
Tons/linear feet:	9 tons

#### Assumptions

• Design High Water (DHW):	582.5 ft *
• Design Water Level:	580.0 ft
• Design Low Water (DLW):	577.5 ft *
• Existing clay till elevation at breakwater toe:	574.0 ft
• 20-yr lakebed erosion at toe of breakwater:	3 ft**
• Design wave height (Hs):	5.85 ft

### Assumptions (continued)

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• Nearshore Slope:	± 1:50
• Design Wave Period (T):	9.9 s ***
• Depth at Structure Toe DHW (Ds):	6'
• Design Deepwater Wave (Ho):	18.0'
• Design Wave Length (Lo):	501.8'
• Structure Porosity:	37%

\* DHW includes 2 ft storm setup; DLW is equivalent to Low Water Datum

\*\* 2.5 ft sand and gravel (thickness varies) plus 2 ft clay till, Nairn, 1997

\*\*\* Resio & Vincent, 1976

### Stone Breakwater Stability, Armorstone

The proposed quarystone breakwater has two layers of 1 – 4 ton armorstone built on a 1:1.5. Overtopping of the structure is expected during storms and higher water levels. Design conditions include:

- \* Lakeward breakwater crest elevation .5 ft below DHW 4.5 ft above DLW
- \* Depth-limited breaking waves will break on the stone breakwater and sand beach
- \* Depth at the toe of the structure is 8.5 ft (574.0) at design high water
- \* Incident wave directions: NE, E and SE
- \* Wave period for DHW T = 9.5 seconds
- \* Wave period for average conditions T = 6 seconds

For a quarystone breakwater, structural integrity may depend on the ability of the foundation to resist the erosive scour by the highest waves. Therefore, it is suggested that the selected design wave height  $H_s$  for such structures be based on the design wave height  $H$  being the average height of the top 10 percent of waves expected during an extreme event. Based on the deepwater significant wave height  $H_s$  corrected for refraction and shoaling.

The stability number ( $K_d$ ) is primarily affected by the depth of the stone foundation and toe protection below the still water level and the depth of the structure.

The equation below is Hudson's formula and is used to determine the armor stone weight needed to support a particular structure.

$$W = (W_r * H_s^3) / (((K_d [W_r / W_w] - 1) * \cot(\beta)))$$

$W$  = weight of individual armor units in lbs

$W_r$  = Unit weight of armor units

$W_w$  = unit weight of water

$H_s$  = the design wave height for the structure

$K_d$  = the design stability coefficient for rubble and toe protection

$\beta$  = the angle of incline of the structure

Quartzite armorstone is recommended as it is highly durable and is locally available in most gradations under 5 tons. Hudson's formula was used to estimate armorstone size. As the lakeward face of the breakwater will be built random placement, an armorstone of 1.3 tons is predicted for special placement stone based on the design conditions.

### Bathymetry

Bathymetric profiling was performed on 5/21/2014. Five transects were completed in the project area. The profiles extend up to 450 ft east of the existing seawall. Survey work was completed by Greengard, Inc.

### Water Levels

The following table summarizes water level data representing daily highest extremes measured at Calumet Harbor, Illinois, approximately 27 miles to the south of Winnetka. Note: Low water datum = 577.5 ft (IGLD 1985).

<u>Lake Level</u>	<u>LWD</u>	<u>IGLD 1985</u>
Record High	+5.5	583.0
Record Low	-1.4	576.1

### Project Supporting Data

To help facilitate project review, SA offers the following supporting data based on standard coastal engineering practices:

- Sediment Transport Around Structure** The structure is designed to lie within the surf zone (zone of breaking waves), therefore allowing sediment transport around the structure. The range of breaking wave heights is from 7.4 ft based on a 6-second wave with a wave length of 184 ft (using  $1/25 L_o$ ) to 18 ft based on a 9.9-second wave with a wave length of 501.8 ft (Resio and Vincent, 1976). The commonly accepted zone of sediment transport is to 18 ft (depth of closure) in this section of Lake Michigan, which is a function of the design wave parameters. Based on this data, once the structure has been filled with sand, it will continue to bypass littoral drift sand. Rod and transit survey monitoring will be conducted, as required by the IDNR, to assure that the system performs as designed.  
  
The IDNR requires sand fill in areas where sediment will be trapped by the new system. Sand volume quantities have been calculated as shown in the permit drawings. As required by the IDNR, a 20% overfill will be added to the calculated volume. Additionally, the new pre- and post-construction monitoring will be performed and submitted to the IDNR to verify the impacts to the system.
- Effect on Adjacent Shorelines** A wave diffraction diagram (Figure 4, Appendix) has been overlain on the proposed shore protection system. Using a refracted incident wave angle of 90 degrees (USACE, Shore Protection Manual), with average and design waves, there will be a decrease in wave energy on adjacent properties. The wave diffraction pattern shows that the coefficient of diffraction (K) reduces the wave energy to a distance of about  $\frac{1}{2}$  the wave length downdrift and does not have an impact further downdrift. For the average 6-second wave, that distance of reduced wave energy is about 90 ft and for the design wave, the protected distance is about 250 ft. This protected area close to the structure has diminished wave energy that will in turn reduce erosion in the area.
- Wave Reduction in Rubble-Mound Structures** The Iribarren number ( $\xi$ ), or surf similarity number, is used to determine the wave reflection coefficient. For rubble-mound structures, wave reflection (and wave energy) is reduced by one half or more (0.2 to 0.53) (Figure 5, Appendix). For example, a wave reflection of 0.25 means that the wave energy is reduced by 75%. The range of wave reflection for beaches peaks at about 0.44. The range for plane slopes, however, quickly rises to 0.5 and peaks at .91. This illustrates that rubble-mound structures reduce wave energy almost as well as beaches.

### **Lakebed Erosion**

Lakebed erosion, active in water depths of 10 ft or less, is a design component of this plan. This section of Winnetka lakeshore is considered sediment-starved. Sand deposits were measured near this site (Elder Lane Beach, Winnetka see Figures 1 & 2 in the Appendix) from the backshore to a depth of 6.7 m (22 ft) in 1989. In July of 2010, the clay depth and sand cover was resurveyed to a depth of 2m (6.3 ft). In 1989, the nearshore sand deposits averaged 1.6 to 2.0 ft thick from shore to 50 ft offshore and thinned to 0 feet thickness at 100 ft, and then thickening to 4.5 ft at 250 ft offshore. At 1,000 ft offshore, no sand was present through the end of the transect. Farther offshore, the sand ranged from 1.8 to 2.9 ft thick (Shabica & Pranschke, 1994). In 2010, the nearshore sand deposits were typically 1 foot thick with the exception of a sandbar that averaged 2 feet thick. The site is underlain by highly-erodable, cohesive glacial clay-till. During the period from 1989 to 2010, erosion of the clay lakebed varied from negligible to 2.3 ft. The 2.3 ft of erosion occurred in the location where there was no sand cover in 1989. See Shabica survey data and cross-section (see cover letter dated June 23, 2011 and Figures 1, 2, and 3, Appendix) showing loss of lakebed sand from 1975 to 1989. Calculated sand deposits at this site in 1989 were 161 cubic meters per meter of lakeshore to a depth of 4 meters. According to Robert Nairn, approximately 200 m<sup>3</sup> of sand cover per meter of lakeshore (out to a depth of 4 m) is necessary to protect the underlying cohesive profile from lakebed erosion under most conditions. Sand and coarser sediments represent typically less than 15% of the material eroding from the lakebed and bluffs.

Using the historic rate of lakebed downcutting of 0.15 ft/yr (Nairn, 1997), an irreversible lowering of the nearshore lakebed clay of approximately 3.0 ft over a 20-year period is predicted in unprotected areas. With the stone breakwater, revetment and sandfill installed, the lakebed erosion will be reduced.

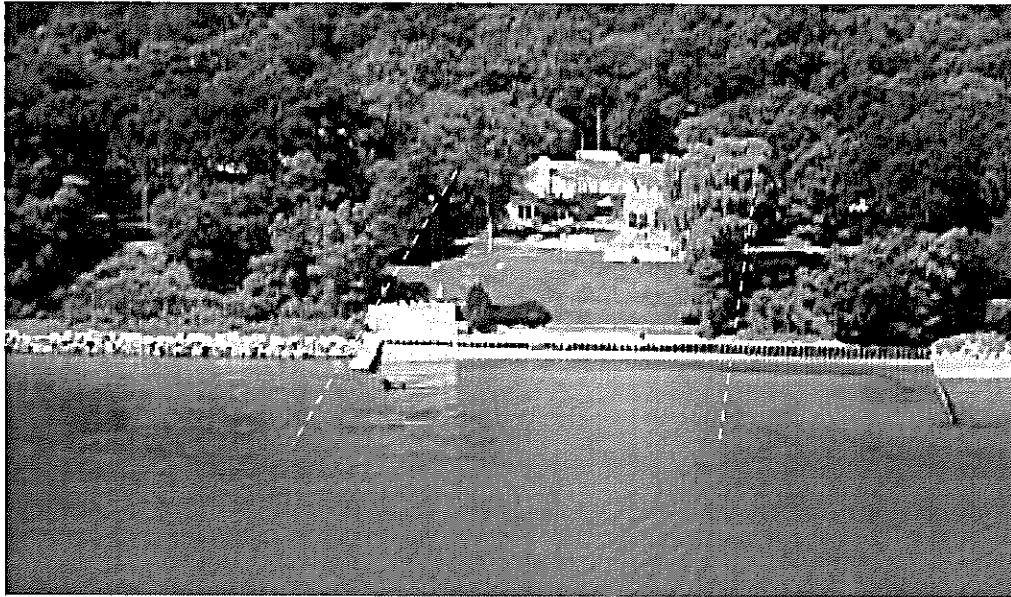
### **Project Monitoring**

As the performance of shore protection structures cannot be predicted with absolute certainty, the shore protection system for 609 Sheridan Road, Winnetka will be inspected as required by IDNR guidelines. This includes topographic and hydrographic surveys beginning at an elevation of 581.5 ft (IGLD 1985) and progressing to 300 ft lakeward of the lakeward end of the project, within the north and south property lines. Additionally, all structures should be inspected to assure that they continue to meet design specifications.

## References

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- Shabica, C.W., F. Pranschke and M. Chrzastowski. 1991, *Survey of Littoral Drift Sand deposits Along the Illinois Shore of Michigan from Fort Sheridan to Evanston*, Illinois/Indiana Sea Grant Program, IL-IN-SG-R-91-3.
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- US Army Corps of Engineers, 1984, *Shore Protection Manual*, Coastal Engineering Research Center, Vicksburg, Mississippi.

**PHOTO 1**



1997 Aerial Photo Approximate Property Lines in Yellow

**PHOTO 2**



2008 Photo, note the extent of wave run-up on the sand and narrow beach at north end of the cell

## FIGURE 1

Winnetka - Elder Lane

Date:06/27/89 Time:

Enter lake surface 578.90 elevation for time of survey

Enter Graph:

DATA A

DATA B

DATA C

Enter Dist. From Shore	Enter Water Depth	Enter Sand Thick- ness	Top of Sand Elev. 1990	Bottom of Sand Elev. 1990	Enter Sand Thick. 1975	Top of sand 1975	Enter Hard- pan Type	Sand Volume Cu.Yd. Per ft.	
								1975	1990
-10.0	-1.0	2.0	579.9	577.9	10.0	587.9		1.9	0.4
0.0	0.0	1.8	578.9	577.1	10.0	587.1		6.5	1.2
25.0	0.8	1.6	578.1	576.5	10.0	586.5		9.3	1.5
50.0	1.9	1.9	577.0	575.1	10.0	585.1		13.9	2.6
100.0	3.3	0.0	575.6	575.6	10.0	585.6		18.5	0.0
150.0	5.9	0.7	573.0	572.3	10.0	582.3		27.8	1.9
250.0	6.5	4.5	572.4	567.9	10.0	577.9		64.8	29.2
500.0	9.8	2.9	569.1	566.2	7.0	573.2		64.8	26.9
750.0	13.3	1.0	565.6	564.6	5.0	569.6		46.3	9.3
1000.0	15.0	0.0	563.9	563.9	4.0	567.9		37.0	0.0
1250.0	15.9	2.6	563.0	560.4	3.0	563.4		27.8	24.1
1500.0	16.9	2.9	562.0	559.1	3.0	562.1		27.8	26.9
1750.0	20.3	1.8	558.6	556.8	2.0	558.8		18.5	16.7
2000.0			578.9	578.9		578.9		0.0	0.0
0.0			578.9	578.9		578.9		0.0	0.0
0.0			578.9	578.9		578.9		0.0	0.0
0.0									

Note all measurements in feet

TOTAL 364.8 140.5  
CuYd/ft CuYd/ft  
1975 1990

**FIGURE 2**

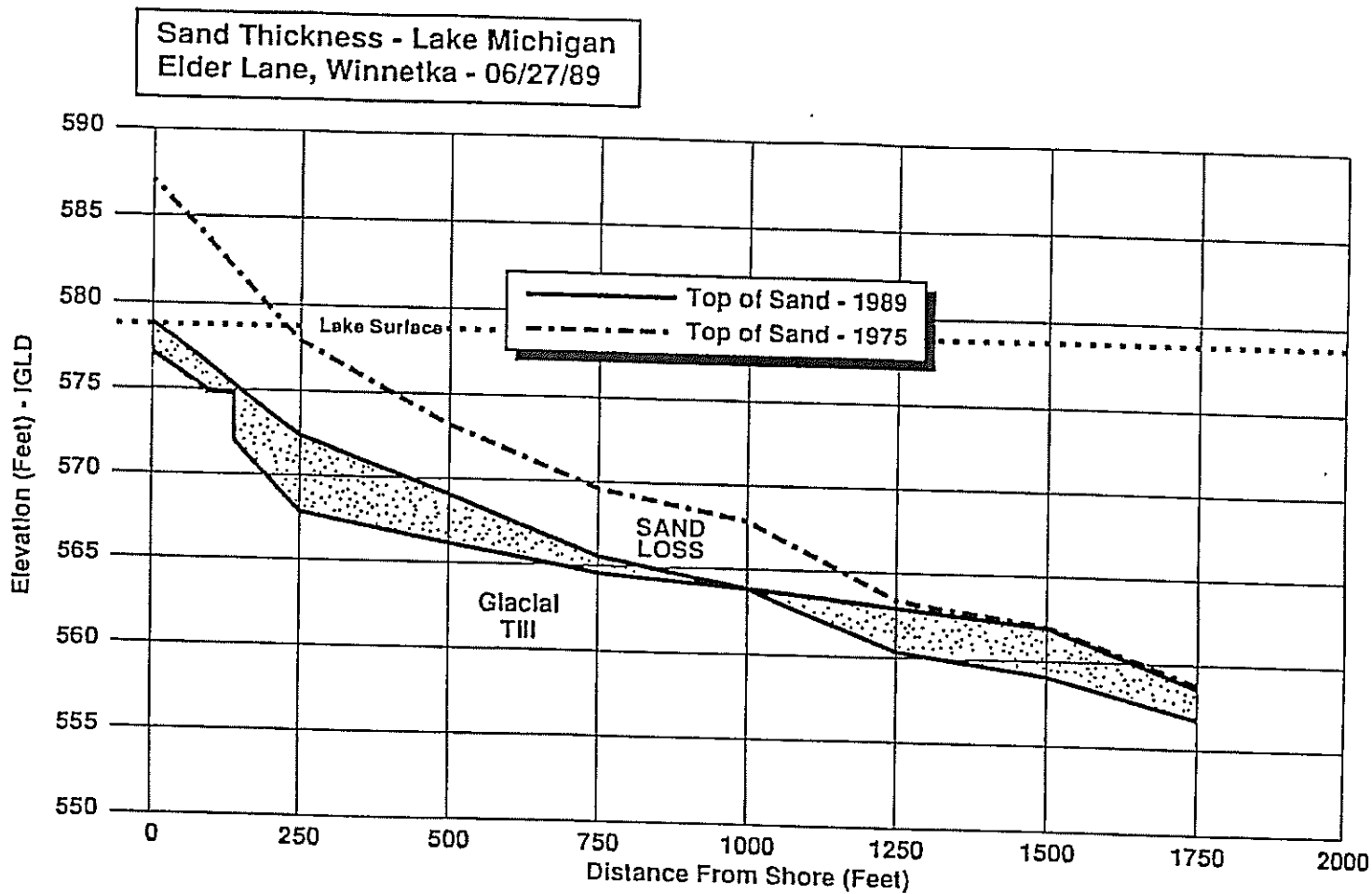
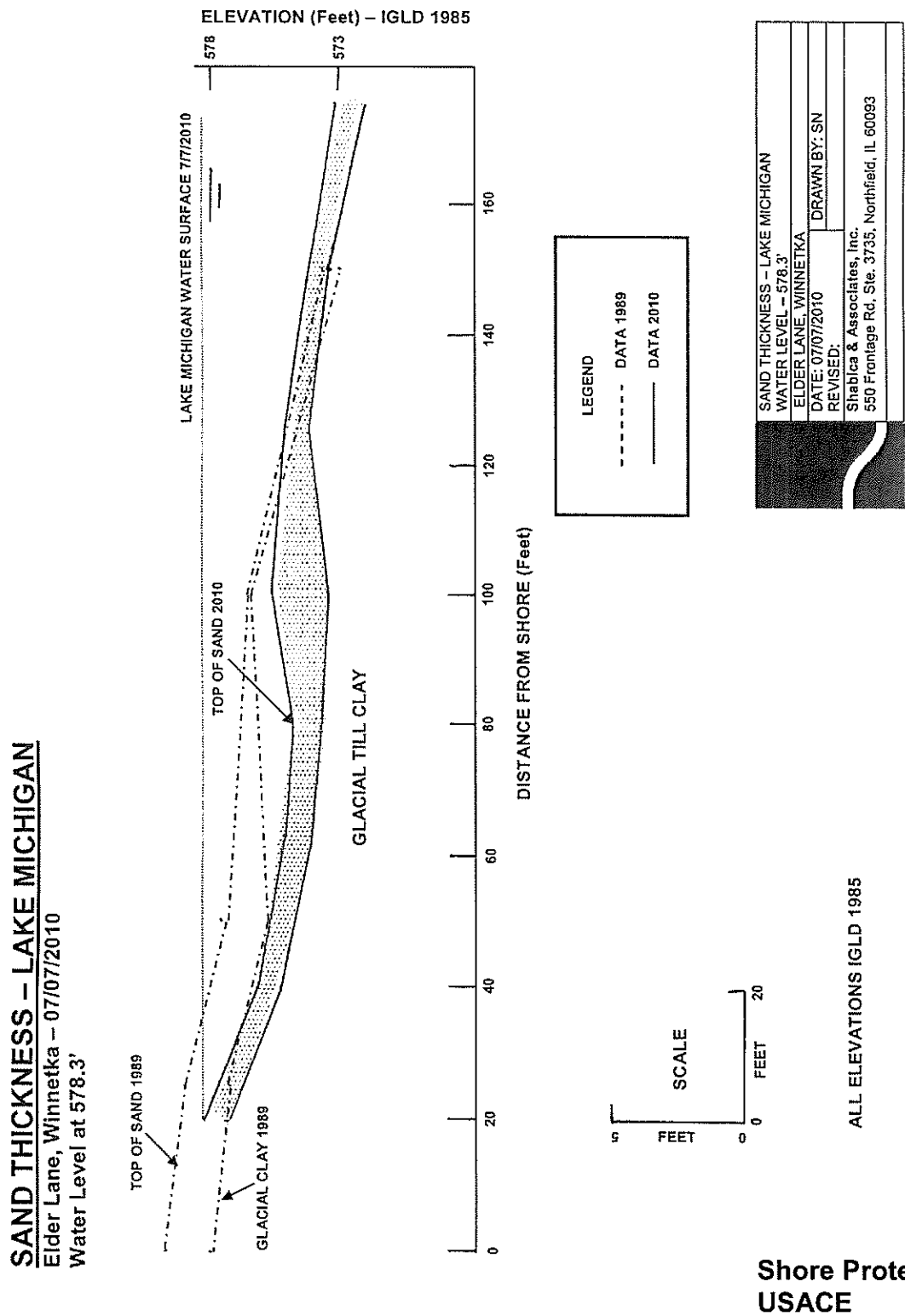
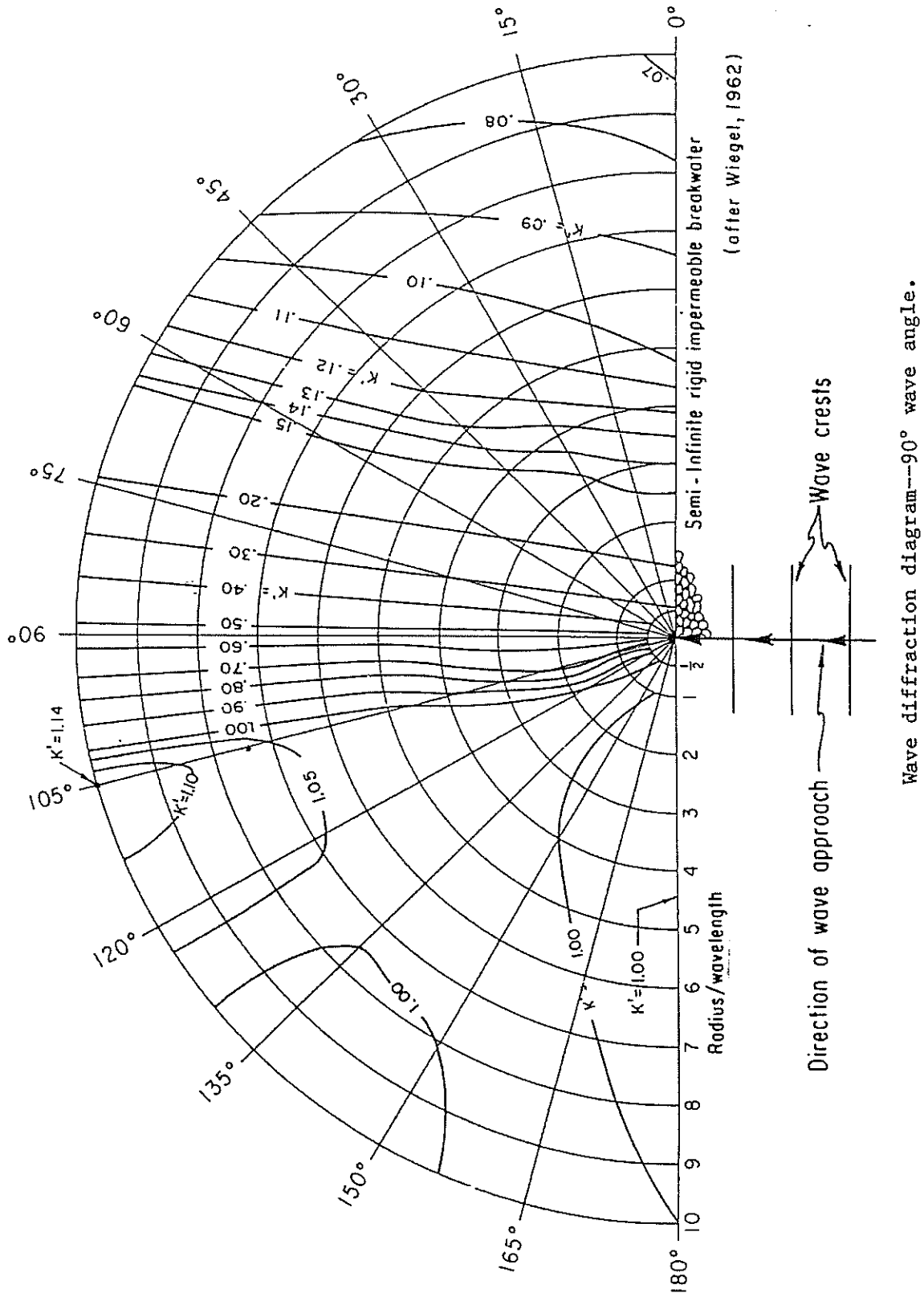


FIGURE 3

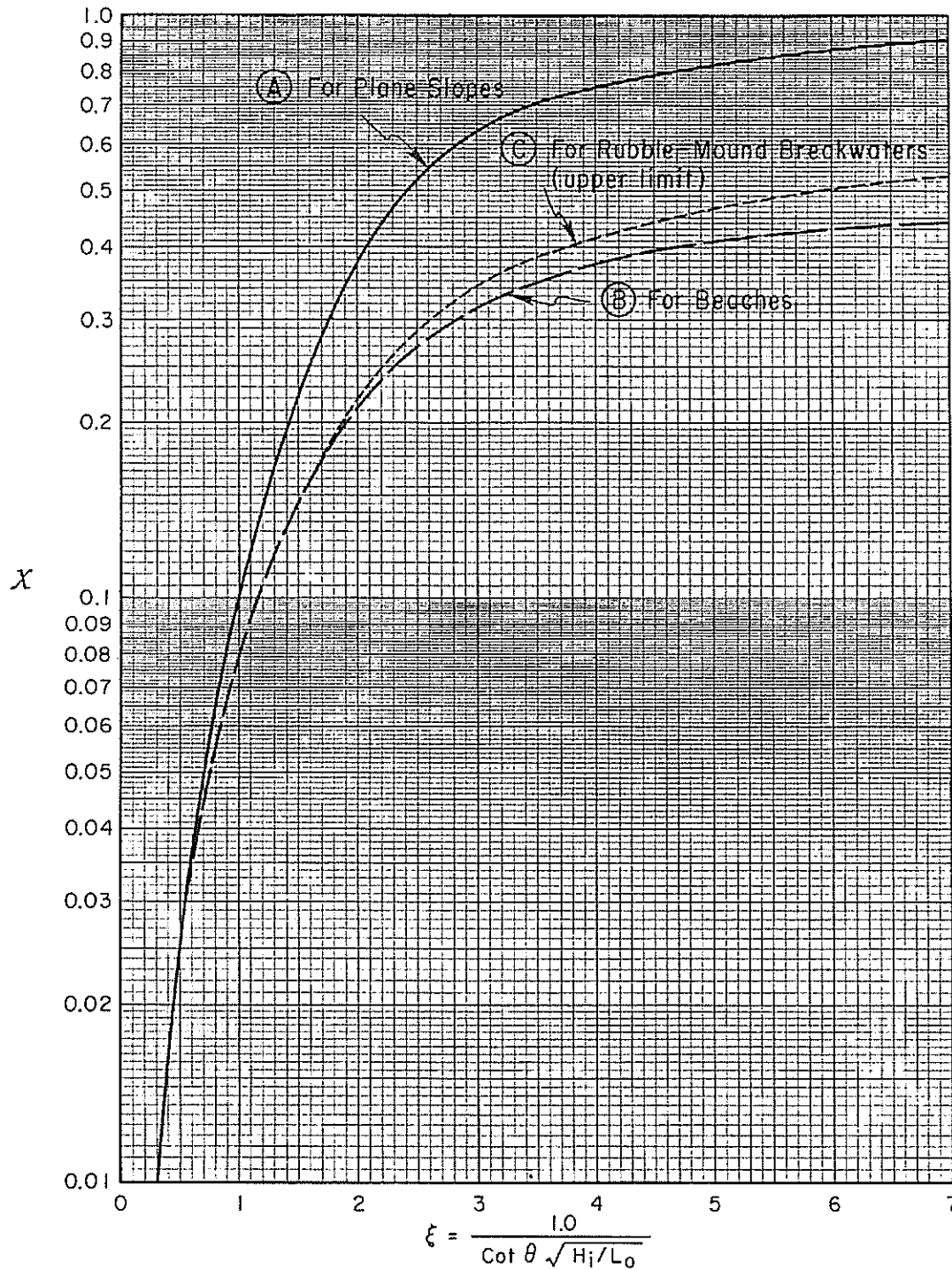


Shore Protection Manual  
USACE

Figure 4



**FIGURE 5**



Wave reflection coefficients for slopes, beaches, and rubble-mound breakwaters as a function of the surf similarity parameter  $\xi$ .

**Shore Protection Manual USACE**

# JOINT APPLICATION FORM FOR ILLINOIS

## ITEMS 1 AND 2 FOR AGENCY USE

1. Application Number	2. Date Received
-----------------------	------------------

## 3. and 4. (SEE SPECIAL INSTRUCTIONS) NAME, MAILING ADDRESS AND TELEPHONE NUMBERS

<b>3a. Applicant's Name:</b> <b>Jeffrey Quicksilver</b> Company Name (if any) :  Address: <b>609 Sheridan Road</b> <b>Winnetka, IL 60093</b>  Email Address: [REDACTED]	<b>3b. Co-Applicant/Property Owner Name</b> (if needed or if different from applicant):  Company Name (if any):  Address:   Email Address:	<b>4. Authorized Agent (an agent is not required):</b> <b>Jon Shabica</b> Company Name (if any): <b>Shabica &amp; Associates, Inc.</b> Address: <b>550 Frontage Road</b> <b>Suite 3735</b> <b>Northfield, IL 60093</b>  Email Address: <b>jon@shabica.com</b>
Applicant's Phone Nos. w/area code Business: [REDACTED] Residence: Cell: Fax:	Applicant's Phone Nos. w/area code Business: Residence: Cell: Fax:	Agent's Phone Nos. w/area code Business: <b>847-446-1436</b> Residence: Cell: Fax: <b>847-716-2007</b>

## STATEMENT OF AUTHORIZATION

I hereby authorize, Shabica & Associates, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

[Signature]                      7/19/14  
 Applicant's Signature                      Date

## 5. ADJOINING PROPERTY OWNERS (Upstream and Downstream of the water body and within Visual Reach of Project)

Name	Mailing Address	Phone No. w/area code
a. see attached vicinity map		
b.		
c.		
d.		

**6. PROJECT TITLE:**  
**Breakwater-Protected Beach**

**7. PROJECT LOCATION:**  
**609 Sheridan Road, Winnetka, IL 60093**

LATITUDE: <b>42.10835</b> °N LONGITUDE: <b>-87.72551</b> °W	UTM's Northing: <b>4662074.24</b> Easting: <b>167440025.00</b>										
STREET, ROAD, OR OTHER DESCRIPTIVE LOCATION <b>609 Sheridan Road</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">LEGAL DESCRIPT</th> <th style="width: 15%;">QUARTER</th> <th style="width: 15%;">SECTION</th> <th style="width: 20%;">TOWNSHIP NO.</th> <th style="width: 35%;">RANGE</th> </tr> <tr> <td></td> <td style="text-align: center;"><b>NE</b></td> <td style="text-align: center;"><b>21</b></td> <td style="text-align: center;"><b>42N</b></td> <td style="text-align: center;"><b>13E</b></td> </tr> </table>	LEGAL DESCRIPT	QUARTER	SECTION	TOWNSHIP NO.	RANGE		<b>NE</b>	<b>21</b>	<b>42N</b>	<b>13E</b>
LEGAL DESCRIPT	QUARTER	SECTION	TOWNSHIP NO.	RANGE							
	<b>NE</b>	<b>21</b>	<b>42N</b>	<b>13E</b>							
<input checked="" type="checkbox"/> IN OR <input type="checkbox"/> NEAR CITY OF TOWN (check appropriate box) Municipality Name <b>Winnetka</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 75%;">WATERWAY</th> <th style="width: 25%;">RIVER MILE (if applicable)</th> </tr> <tr> <td style="text-align: center; height: 40px;"><b>Lake Michigan</b></td> <td></td> </tr> </table>	WATERWAY	RIVER MILE (if applicable)	<b>Lake Michigan</b>							
WATERWAY	RIVER MILE (if applicable)										
<b>Lake Michigan</b>											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">COUNTY</th> <th style="width: 25%;">STATE</th> <th style="width: 50%;">ZIP CODE</th> </tr> <tr> <td style="text-align: center;"><b>Cook</b></td> <td style="text-align: center;"><b>IL</b></td> <td style="text-align: center;"><b>60093</b></td> </tr> </table>	COUNTY	STATE	ZIP CODE	<b>Cook</b>	<b>IL</b>	<b>60093</b>					
COUNTY	STATE	ZIP CODE									
<b>Cook</b>	<b>IL</b>	<b>60093</b>									

Revised 2010

☐ Corps of Engineers    
 ☐ IL Dep't of Natural Resources    
 ☐ IL Environmental Protection Agency    
 ☐ Applicant's Copy

8. PROJECT DESCRIPTION (Include all features):

Construct a new quarystone breakwater and a revetment along the existing concrete pier and seawall at 609 Sheridan. The proposed south breakwater will extend approximately 125' offshore from the existing seawall, and will have a crest elevation of 584' landward tapering to 582' lakeward (elevations in IGLD 1985). The revetment will be constructed adjacent to the the seawall and extend for approximately 11' in order to help retain sand in the system. The crest elevation for the revetment will be 586'. 1,850 tons of clean sand will be placed in the system as required by the IDNR.

9. PURPOSE AND NEED OF PROJECT:

To stabilize the site as well as reduce deepening of the lakebed caused by lakebed erosion.

COMPLETE THE FOLLOWING FOUR BLOCKS IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

10. REASON(S) FOR DISCHARGE:

Shore protection in the form of a breakwater-protected beach.

11. TYPE(S) OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS FOR WATERWAYS:

TYPE: Stone and Sand

AMOUNT IN CUBIC YARDS:

Sand: 1480 cu. yds Stone: 510 cu. yds

12. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED (See Instructions)

.075 acres

13. DESCRIPTION OF AVOIDANCE, MINIMIZATION AND COMPENSATION (See Instructions)

Utilize steel in place of stone, where appropriate, to minimize the footprint of structures on the lakebed.

14. Date activity is proposed to commence

July 15, 2014

Date activity is expected to be completed

September 30, 2014

15. Is any portion of the activity for which authorization is sought now complete?

Yes

☐

No

☒

NOTE: If answer is "YES" give reasons in the Project Description and Remarks section. Indicate the existing work on drawings.

Month and Year the activity was completed

16. List all approvals or certification and denials received from other Federal, interstate, state, or local agencies for structures, construction, discharges or other activities described in this application.

Issuing Agency

Type of Approval

Identification No.

Date of Application

Date of Approval

Date of Denial

17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HEREBY GRANTED.

Yes

☒

No

18. APPLICATION VERIFICATION (SEE SPECIAL INSTRUCTIONS)

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

Signature of Applicant or Authorized Agent

8/26/2014

Date

Signature of Applicant or Authorized Agent

Date

Signature of Applicant or Authorized Agent

Date

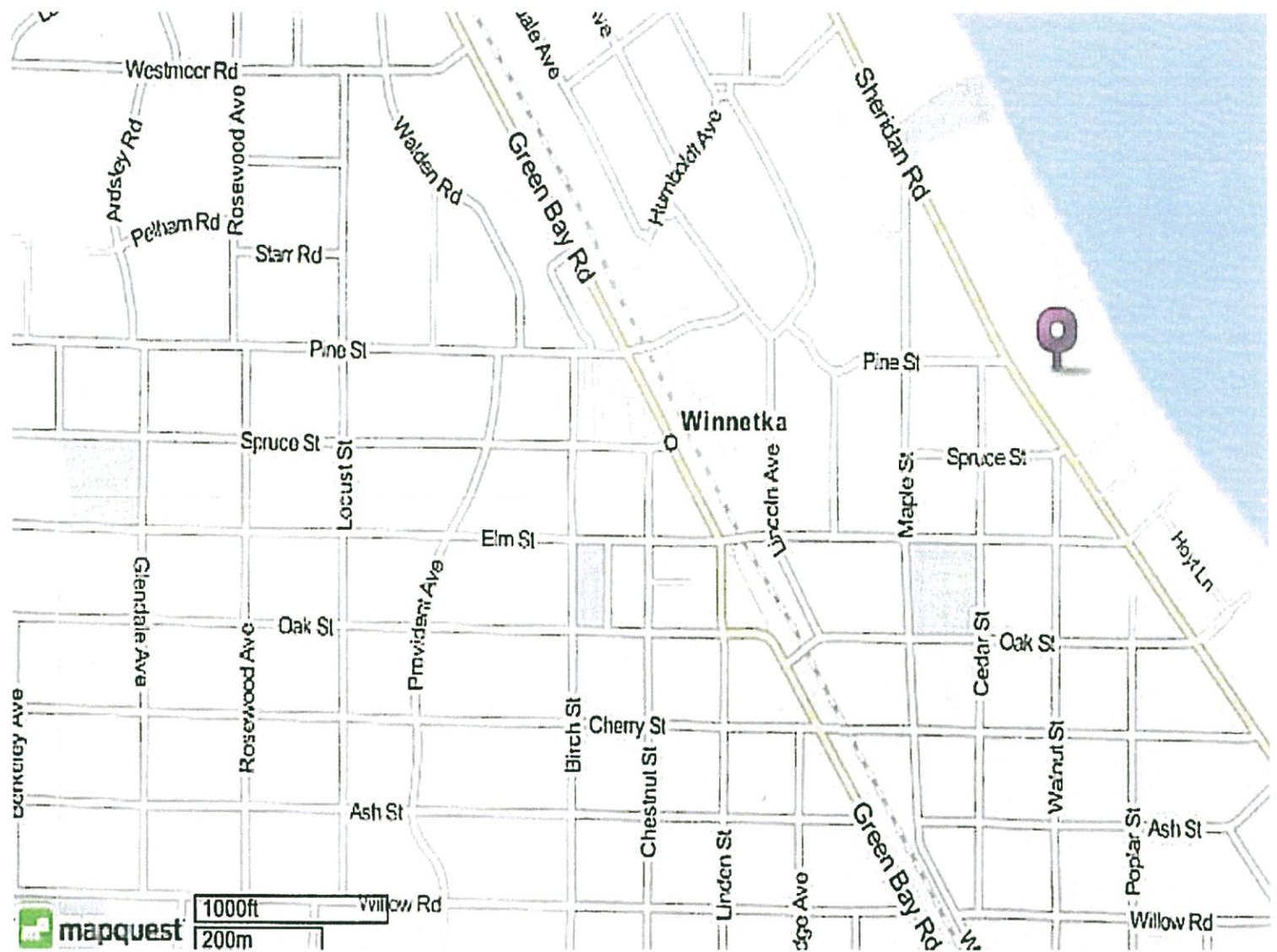
☐ Corps of Engineers  
Revised 2010

☐ IL Dep't of Natural Resources

☐ IL Environmental Protection  
Agency

☐ Applicant's Copy

SEE INSTRUCTIONS FOR ADDRESS

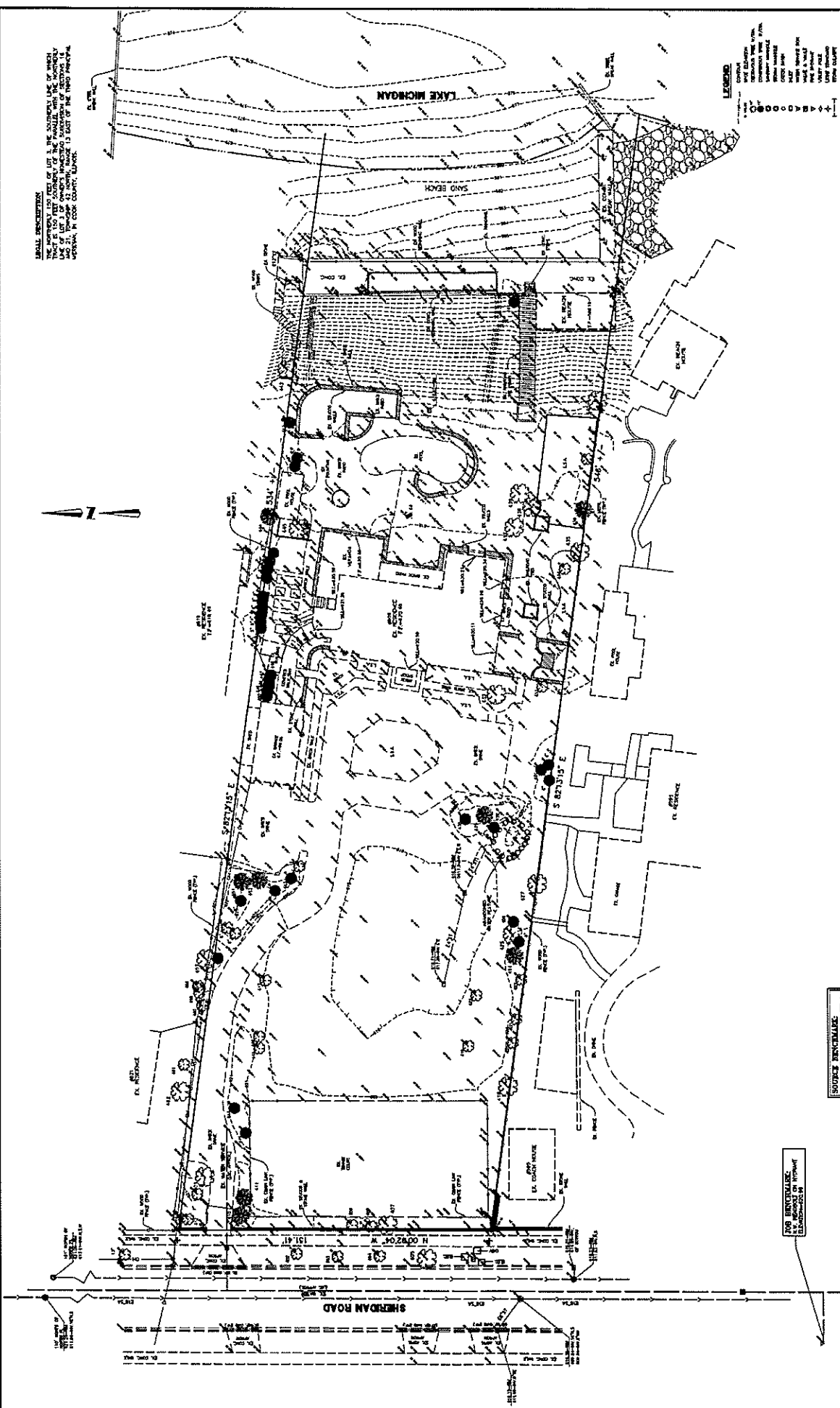


Breakwater-Protected Beach

609 Sheridan Road  
Winnetka, IL 60093

**SMALL DESCRIPTION**

THESE PLANS AND SPECIFICATIONS ARE FOR THE CONSTRUCTION OF THE SHERRIDAN ROAD - WINNEKA, ILL. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES.



**LEGEND**

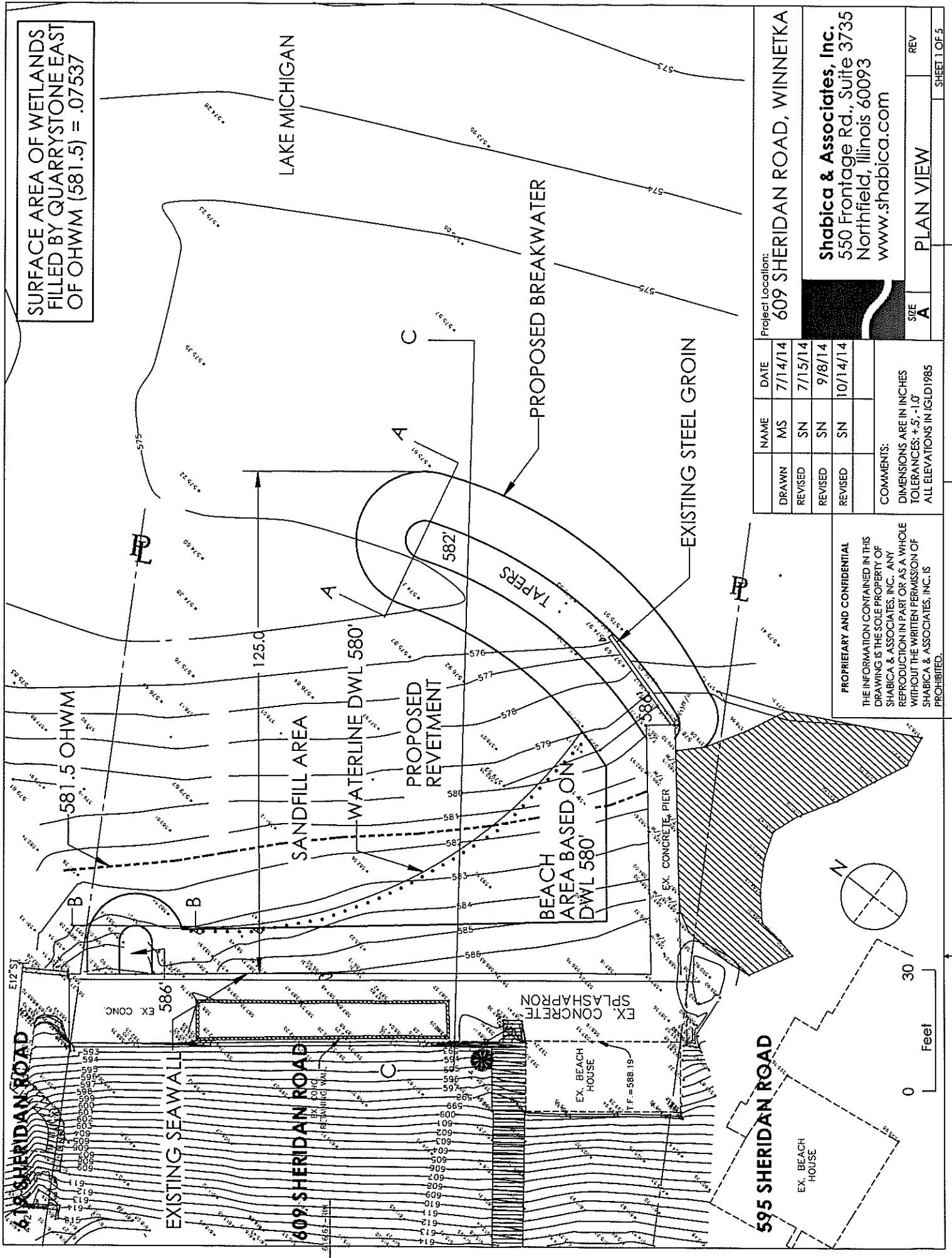
- EXISTING ROAD
- PROPOSED ROAD
- EXISTING BUILDING
- PROPOSED BUILDING
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING UTILITY
- PROPOSED UTILITY
- EXISTING TREE
- PROPOSED TREE
- EXISTING SAND BEACH
- PROPOSED SAND BEACH
- EXISTING LAKE MICHIGAN
- PROPOSED LAKE MICHIGAN

609 SHERIDAN ROAD - WINNEKA, IL		1"=20'		59259		1"=2'		59259	
GREENGARD, INC.		Engineers & Surveyors		118 N. Main St., Suite 310, Winneka, IL 60093-2523		118 N. Main St., Suite 310, Winneka, IL 60093-2523		118 N. Main St., Suite 310, Winneka, IL 60093-2523	
EXISTING TOPOGRAPHY		1"=20'		1"=2'		1"=20'		1"=2'	

**NOTE**  
THIS PLAN IS A PART OF A SET OF PLANS FOR THE CONSTRUCTION OF THE SHERRIDAN ROAD - WINNEKA, IL. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES.

**AS SHOWN**  
IN RECORD OF SURVEY  
FILED 11-1-11

**NOTES**  
1. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES. THE PROJECT IS A 1.5 MILE LONG ROAD WITH A TOTAL AREA OF 1.5 ACRES.



SURFACE AREA OF WETLANDS  
FILLED BY QUARRYSTONE EAST  
OF OHWM (581.5) = .07537

LAKE MICHIGAN

PROPOSED BREAKWATER

EXISTING STEEL GROIN

SANDFILL AREA

WATERLINE DWL 580'

PROPOSED  
REVETMENT

TAPERS

BEACH  
AREA BASED ON  
DWL 580'

EX. CONCRETE PIER

EX. CONCRETE  
SPLASHAPRON

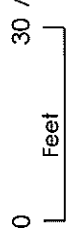
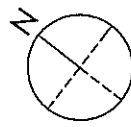
EX. BEACH  
HOUSE

EXISTING SEAWALL

609 SHERIDAN ROAD

595 SHERIDAN ROAD

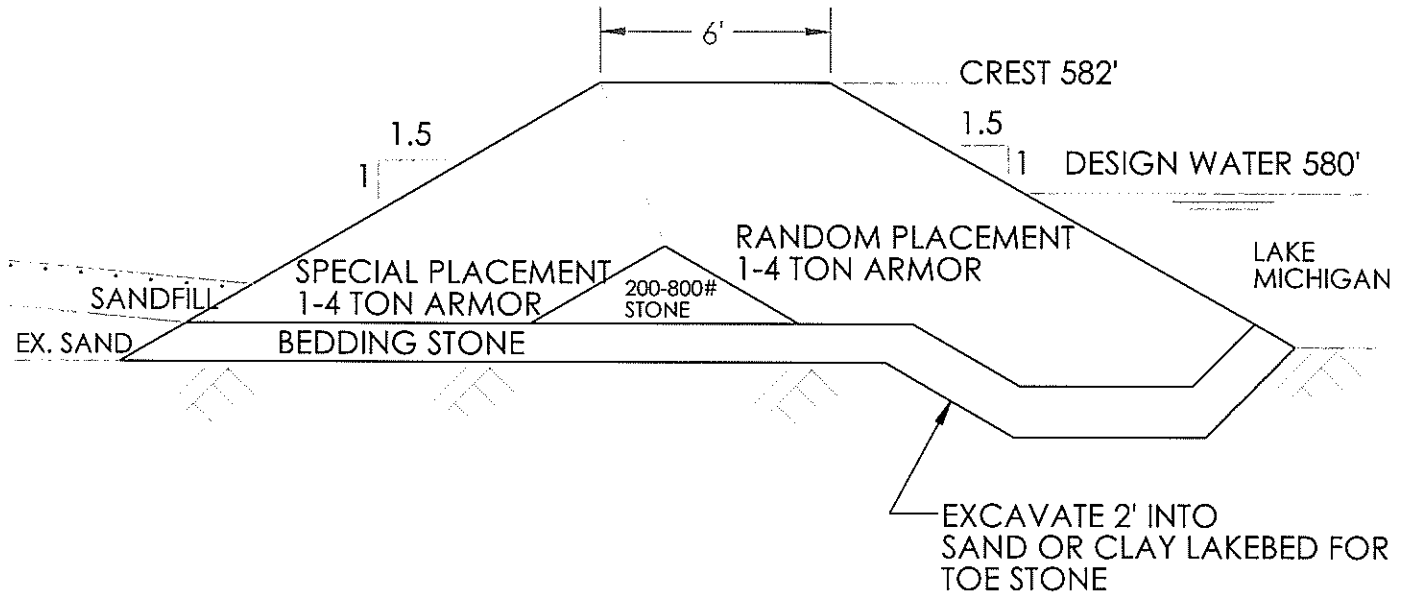
EX. BEACH  
HOUSE



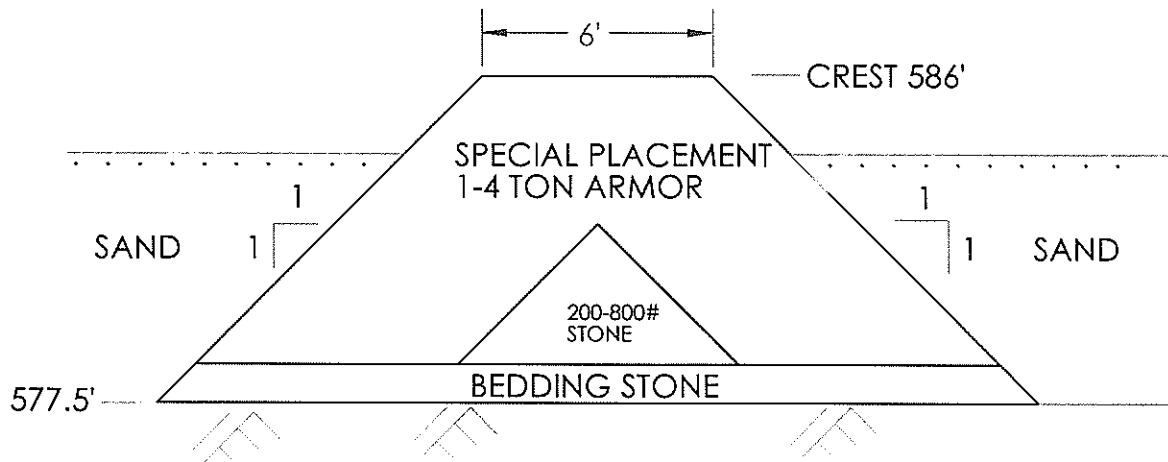
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NAME	DATE	MS	7/14/14	SN	7/15/14
DRAWN	REVIS	SN	9/8/14	SN	10/14/14
REVIS	REVIS	SN		SN	
COMMENTS:					
DIMENSIONS ARE IN INCHES					
TOLERANCES +.5", -1.0"					
ALL ELEVATIONS IN IGLD 1985					
Project Location:		609 SHERIDAN ROAD, WINNETKA			
Shabica & Associates, Inc.		550 Frontage Rd., Suite 3735			
		Northfield, Illinois 60093			
		www.shabica.com			
SIZE		A		PLAN VIEW	
REV				SHEET 1 OF 5	

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# BREAKWATER CROSS SECTION A-A



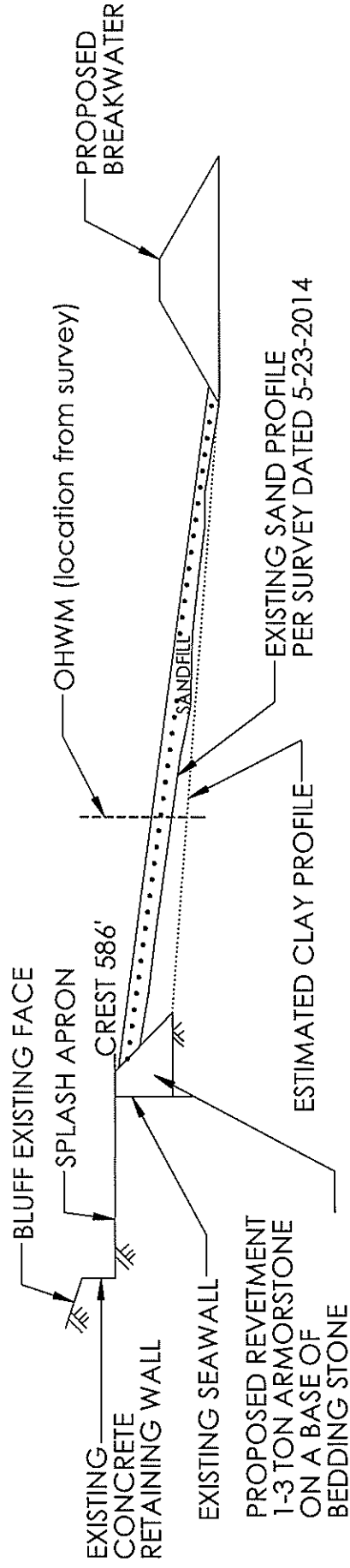
## CROSS SECTION B-B




	NAME	DATE	Project Location:
DRAWN	MS	6/25	609 SHERIDAN ROAD, WINNETKA
CHECKED	SN	6/25	
COMMENTS:			Shabica & Associates, Inc. 550 Frontage Rd., Suite 3735 Northfield, Illinois 60093 847-446-1436 www.shabica.com
DIMENSIONS ARE IN FEET TOLERANCES: +.5', -1' ALL ELEVATIONS IN IGLD 1985			SIZE A CROSS SECTIONS A-A B-B
SCALE 1"=5'			REV.
			SHEET 2 OF 5

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# CROSS SECTION C-C



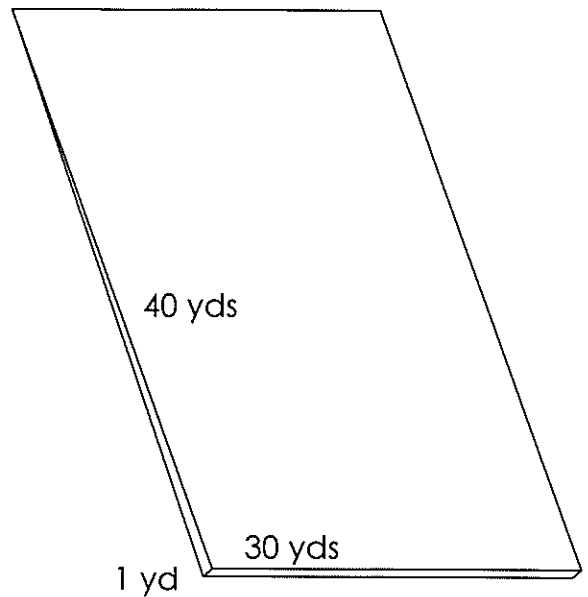
ALL ELEVATIONS IN IGLD 1985

NAME		DATE	Project Location:	
DRAWN	MS	6/26/14	609 SHERIDAN ROAD, WINNETKA	
REVISED	SN	6/26/14	 <b>Shabica &amp; Associates, Inc.</b> 550 Frontage Rd., Suite 3735 Northfield, Illinois 60093 www.shabica.com	
REVISED	SN	9/8/14		
COMMENTS:			SIZE	REV
DIMENSIONS ARE IN INCHES			A	CROSS SECTION C-C
TOLERANCES: +.5', -1.0'			1:20	SHEET 3 OF 5
ALL ELEVATIONS IN IGLD 1985				

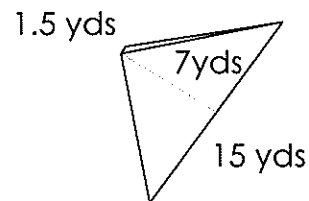
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VOL A:  $\frac{40 \text{ yds} \times 30 \text{ yds} \times 1 \text{ yd}}{2} = 1,200 \text{ yds}^3$



VOL B:  $\frac{15 \text{ yds} \times 7 \text{ yds} \times 1.5 \text{ yds}}{6} = 26 \text{ yds}^3$



**TOTAL:**

$1,226 \text{ yds}^3 \times 1.25 \text{ yds/ton} = 1,532 \text{ tons}$

$1,532 \text{ tons} \times 20\% \text{ overfill} = 306 \text{ tons}$

**TOTAL:**

$1,532 \text{ tons} + 306 \text{ tons} = 1,838 \text{ tons}$

**1,850 Tons Clean Sand  
To Be Placed**

**PROPRIETARY AND CONFIDENTIAL**  
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	NAME	DATE	Project Location:
DRAWN	MS	7/23	609 SHERIDAN RD. WINNETKA
CHECKED	SN	7/23	
			<b>Shabica &amp; Associates, Inc.</b> 550 Frontage Rd., Suite 3735 Northfield, Illinois 60093 847-446-1436 www.shabica.com
COMMENTS:			SIZE
DIMENSIONS ARE IN FEET TOLERANCES: +.5', -1' ALL ELEVATIONS IN IGLD 1985			<b>A SAND CALCULATIONS</b>
			SCALE 1"=5'
			REV.
			SHEET 5 OF 5